

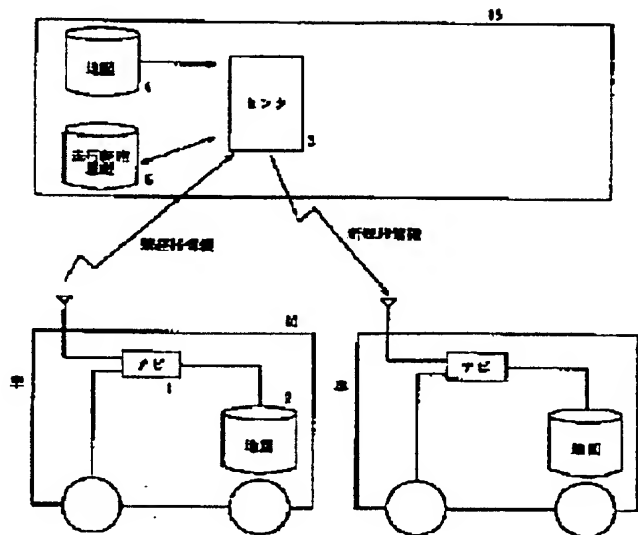
DYNAMIC MAP DATA UPDATING SYSTEM

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Abstract of JP2000258176

PROBLEM TO BE SOLVED: To enable a navigator to display a just now updated map data by a down-link. **SOLUTION:** The system comprises means 1 for transmitting run history data including position information to a center unit 15 upon running of a vehicle on a route not contained in route data, means 3 for transmitting route information showing the route is a new one not contained in the route data to the vehicle when the center unit 15 recognizes the new route not contained in the route data, based on the run history data transmitted from the vehicle, and means for displaying the new route information transmitted from the center unit 15.



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CLAIMS

[Claim(s)]

[Claim 1] It is the renewal system of dynamic map data which consists of the navigation equipment and this navigation equipment which are carried in a car, and center equipment which performs an informational exchange. Said center equipment When it checks that it is the path which is not in path data based on the transit historical data transmitted from said navigation equipment It has at least a means to transmit the path information which shows that it is the new path which is not in path data to said navigation equipment. Said navigation equipment A means to transmit transit historical data including positional information to said center equipment when a car runs the path which is not in path data, A means to receive the path information which shows that it is the new path which is not in path data from said center equipment, The renewal system of dynamic map data characterized by having a means to display said new path information received from said center equipment on a display, and navigation equipment and center equipment updating map data dynamically.

[Claim 2] It is the renewal system of dynamic map data which consists of the navigation equipment and this navigation equipment which are carried in a car, and center equipment which performs an informational exchange. Said center equipment Although it is the path which is not in path data based on the transit historical data transmitted from said navigation equipment, in being unidentified It has at least a means to transmit the path information which shows that it is unidentified although it is the new path which is not in path data to said navigation equipment. Said navigation equipment A means to transmit transit historical data including positional information to said center equipment when a car runs the path which is not in path data, A means to receive the path information which shows an unidentified thing from said center equipment although it is the new path which is not in path data, The renewal system of dynamic map data characterized by having a means to display unidentified path information on a display with a different gestalt from the usual path display gestalt although it is said new path received from said center equipment, and navigation equipment and center equipment updating map data dynamically.

[Claim 3] The renewal system of dynamic map data according to claim 1 or 2 characterized by uplinking said transit historical data from two or more cars in case it checks that it is the path which does not have said center equipment in path data.

[Claim 4] The renewal system of dynamic map data according to claim 1 or 2 characterized by emphasizing a path and making it display in case the new path information received from said center equipment with said navigation equipment is displayed when there is much data of the same path.

[Claim 5] The renewal system of dynamic map data according to claim 1 or 2 characterized by a navigation equipment user enabling it to choose ** which does not display or display the new path information received from said center equipment with said navigation equipment according to an individual.

[Claim 6] The renewal system of dynamic map data according to claim 1 or 2 characterized by traffic carrying out the down link of the abundant links preferentially in case said center equipment transmits the path information which shows that it is the new path which is not in path data to said navigation equipment.

[Claim 7] The renewal system of dynamic map data according to claim 1 or 2 characterized by carrying out the down link of the link through which it has passed at the high speed preferentially in case said center equipment transmits the path information which shows that it is the new path which is not in path

data to said navigation equipment.

[Claim 8] The renewal system of dynamic map data according to claim 1 or 2 characterized by carrying out the down link of the link near a self-vehicle location preferentially in case said center equipment transmits the path information which shows that it is the new path which is not in path data to said navigation equipment.

[Claim 9] It is the renewal system of dynamic map data according to claim 1 or 2 which measures link cost in consideration of the transit rate when a car passes the path, and is characterized by said navigation equipment enable it to use said link cost for path planning when it checks that it is the path which is not in path data in said center equipment.

[Claim 10] The center section equipped with the means of communications for exchanging data with each car, It has the map data file in which renewal of data is possible, and the transit path history file which records the path historical data sent from each car. Said center section Center equipment characterized by having at least a means to transmit the path information which shows that it is the new path which is not in path data when it checks that it is the path which is not in path data based on the transit historical data transmitted from each car to said car.

[Claim 11] The center section equipped with the means of communications for exchanging data with each car, It has the map data file in which renewal of data is possible, and the transit path history file which records the path historical data sent from each car. Said center section Center equipment characterized by having at least a means to transmit the path information which shows that it is unidentified although it is the new path which is not in path data in being unidentified although it is the path which is not in path data based on the transit historical data transmitted from each car to said car.

[Claim 12] The car location calculation means for computing a car location based on a sensor input, and the path hysteresis data file which records an additional path with the directions from the car location calculation means, It has the means of communications for transmitting the path historical data which communicated with center equipment, and received the newest map data or the self-vehicle discovered to center equipment. Furthermore, a means to transmit the transit historical data which include positional information through said means of communications to said center equipment when a car runs the path which is not in path data, Navigation equipment characterized by having a means to receive the path information which shows that it is the new path which is not in path data from said center equipment, and a means to display said new path information which received from said center equipment on a display.

[Claim 13] The car location calculation means for computing a car location based on a sensor input, and the path hysteresis data file which records an additional path with the directions from the car location calculation means, It has the means of communications for transmitting the path historical data which communicated with center equipment, and received the newest map data or the self-vehicle discovered to center equipment. Furthermore, a means to transmit the transit historical data which include positional information through said means of communications to said center equipment when a car runs the path which is not in path data, A means to receive the path information which shows an unidentified thing from said center equipment although it is the new path which is not in path data, Navigation equipment characterized by having a means to display unidentified path information on a display with a different gestalt from the usual path display gestalt although it is said new path received from said center equipment.

[Claim 14] Navigation equipment according to claim 12 or 13 characterized by having further a means to store said new path received from said center equipment.

[Claim 15] Navigation equipment according to claim 14 characterized by leaving the link information around a self-vehicle location, and eliminating other unnecessary link informations in order to secure a new storage region, when the storage capacity of a means to store said new path runs short.

[Claim 16] Navigation equipment according to claim 14 characterized by leaving the link information which remained in the link information or retrieval result used for retrieval, and eliminating other unnecessary link informations in order to secure a new storage region, when the storage capacity of a means to store said new path runs short.

[Claim 17] Navigation equipment according to claim 14 characterized by leaving the link information it

actually ran and eliminating other unnecessary link informations in order to secure a new storage region, when the storage capacity of a means to store said new path runs short.

[Claim 18] Navigation equipment according to claim 14 characterized by for a vehicle leaving the link information of the area it runs frequently, and eliminating other unnecessary link informations in order to secure a new storage region, when the storage capacity of a means to store said new path runs short.

[Claim 19] Navigation equipment according to claim 14 characterized by leaving a link information reliable as a link information, and eliminating other unnecessary link informations in order to secure a new storage region, when the storage capacity of a means to store said new path runs short.

[Claim 20] Navigation equipment according to claim 14 characterized by leaving a new link information and eliminating other unnecessary link informations in order to secure a new storage region, when the storage capacity of a means to store said new path runs short.

[Claim 21] Navigation equipment according to claim 14 characterized by leaving the link information which can be passed at high speed, and eliminating other unnecessary link informations in order to secure a new storage region, when the storage capacity of a means to store said new path runs short.

[Claim 22] Navigation equipment according to claim 14 characterized by leaving the link information which can cross a railroad, a river, etc. and eliminating other unnecessary link informations in order to secure a new storage region, when the storage capacity of a means to store said new path runs short.

[Claim 23] Navigation equipment according to claim 15 to 22 characterized by attaching priority among them and leaving a link information based on the priority when the criteria for leaving a link information overlap in navigation equipment according to claim 15 to 22.

[Claim 24] Navigation equipment according to claim 1 to 23 characterized by searching between the endpoints of the link added, and adding when lower than the original cost.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention is constituted so that the map data updated by the latest can be displayed on the display of navigation (it is hereafter called Nabih for short) equipment by the down link about the renewal system of dynamic map data.

[0002]

[Description of the Prior Art] It enables it to receive road traffic information by Nabih in the car in the conventional VICS system from facilities established in an FM multiplex broadcast or the road side, such as an electric-wave beacon and an optical beacon.

[0003] Under the present circumstances, it is made to transmit ID information on a car to reception and coincidence using a mounted transmitter, and this is transmitted to VICS Center, a traffic information center, and the Public Safety Commission and a road administrator, and comes to be utilized as delay, accident information, a high-speed traffic information, etc. with this new.

[0004] In the conventional navigation system, the map data of Nabih equipment are usually early, and it has become one year of renewal of data, and had become the structure which cannot be updated if one year does not pass on the car which took lessons from the data of the road which is not in the data, i.e., the map data, of the road which increase in number day by day, and has Nabih equipment with much

trouble, either.

[0005] By the way, the car location calculation means 20 for generally, computing the location of a car, as navigation equipment is shown in drawing 7, The information retrieval means 23 for searching a facility using etc., and the path planning means 21 for searching for the path to the facility, It consists of a guiding means 22 which guides a self-vehicle in accordance with the path for which it searched, a display-control means 25 for making it display on the drops 26, such as a liquid crystal display and a CRT display, and map data 27 memorized by storages, such as CD-ROM.

[0006]

[Problem(s) to be Solved by the Invention] This invention solves the above-mentioned conventional problem, and it aims at offering the renewal system of dynamic map data constituted so that the map data updated by the latest could be displayed on navigation equipment by the down link.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned problem, this invention is a renewal system of dynamic map data which consists of the navigation equipment and this navigation equipment which are carried in a car, and center equipment which performs an informational exchange. When it checks that it is the path which is not in path data based on the transit historical data transmitted from said navigation equipment, said center equipment It has at least a means to transmit the path information which shows that it is the new path which is not in path data to said navigation equipment. Said navigation equipment A means to transmit transit historical data including positional information to said center equipment when a car runs the path which is not in path data, A means to receive the path information which shows that it is the new path which is not in path data from said center equipment, It has a means to display said new path information received from said center equipment on a display, and is characterized by navigation equipment and center equipment updating map data dynamically.

[0008] The effectiveness that the map data which were updated by the above at the latest according to the renewal system of dynamic map data of this invention can be displayed on navigation equipment by the down link is acquired.

[0009]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained using a drawing.

[0010] Drawing 1 shows the whole renewal system configuration of dynamic map data in the gestalt of operation of this invention, and each car 10 is equipped with Nabih equipment 1 and the map data file 2 in which renewal of data is possible in drawing 1. Nabih equipment 1 communicated with the car location calculation means for computing a car location at worst based on a sensor input, the path hysteresis data file which records an additional path with the directions from the car location calculation means, and center equipment, and the newest map data come to hand, or it is equipped with the means of communications for transmitting the path historical data which the self-vehicle discovered to center equipment in here.

[0011] Center equipment 15 is equipped with the center section 3 equipped with the means of communications for exchanging data with each car 10, the map data file 4 in which renewal of data is possible, and the transit path history file 5 which records the path historical data sent from each car 10.

[0012] Actuation of the renewal system of dynamic map data in the gestalt of operation of this invention shown in drawing 1 is explained referring to drawing 2 thru/or drawing 6 below.

[0013] In drawing 1 thru/or drawing 6, since path historical data are transmitted to center equipment 15 using the Nabih equipment 1 of a car 10 when it runs the road which does not have each car in map data (up link), with center equipment 15, this is recorded and accumulated at the transit path history file 5.

[0014] If drawing 2 explains this, if map matching is carried out and matching is correct, with the Nabih equipment 1 of each car, an update process of a self-vehicle location will perform as it is, but when it can presume that it is running a new road by the case where matching separates, for example, a self-vehicle location, a self-vehicle vector, etc. record and accumulate continuously as additional path information at transit path record processing, i.e., a path hysteresis data file.

[0015] processing when matching separates from drawing 3 -- illustrating -- a car -- since -- For the car, since it is the continuation of self-vehicle positional information which will be in the condition of not

matching if it moves on path hysteresis, it records this on a path hysteresis data file as additional path information.

[0016] Moreover, drawing 4 shows the communications processing of center equipment 15 and a car 10. In drawing 4, if the Request to Send of new information is performed to center equipment 15 from a car 10, the path information which the center section 3 is accumulating in the car 10 from center equipment 15 will be returned to a car 10 from center equipment 15. The additional path information which the car 10 discovered and recorded on center equipment 15 from the car 10 on the other hand is transmitted.

[0017] Drawing 5 shows the configuration concerning record of the path historical data uplinked from the car 10 by which record processing is carried out with center equipment 15, and, so to speak, illustrates the contents of the transit path history file 5. In drawing 5, record and are recording of the map data in center equipment 15 Path historical data including the path information presumed that the car discovered (in this) data, such as a LAT LONG point thru/or a velocity vector train, -- containing -- sequence-of-points information (on drawing) The sequence-of-points information record means 6 recorded and accumulated as being abbreviated to sequence of points info, The sequence of points showing the same road uplinked from two or more cars thru/or a vector train are collected as one path link. Record and the information intensive means 7 to accumulate, It consists of path information storing means 8 to store the path historical data of only the path link from this information intensive means, and sequence-of-points information. Therefore, when the car has required new path data, the down link of the link cost can be carried out, and it can be made to use for path planning etc. with center equipment 15, since the cost of a new path link is created from the velocity vector train in path historical data and this can be recorded and accumulated.

[0018] As shown in drawing 5, as sequence-of-points information, the sequence of points of the trigonum mark are obtained from a certain car, the sequence of points of the square mark are obtained from another car, and the sequence of points of a round mark are obtained from still more nearly another car, and when each is given to the information intensive means 7 and judged to be the same road, it will be recorded as one path link.

[0019] In addition, between the endpoints of the path link which is going to be added is searched, and when lower than the original cost, actuation of actually adding may be performed. This eliminates an unnecessary link and it becomes possible to carry out additional registration of the useful link.

[0020] If it is drawing for explaining the down link of the new path information over a car from center equipment and the road display demand including the area for the Nabih display is transmitted from a car in drawing 6, drawing 6 With center equipment 15, as new path information, when it returns as sequence-of-points information in area unidentified when exploration is not yet settled and it has already made a site survey, it returns as path information [finishing / a check]. In this case, although new path information is considered as a path link and an additional indication is given by the car, the method of presentation of an additional path is changed as finishing [a check / be / unidentified], and it displays.

[0021] In addition, a down link is carried out in center equipment 15, when there is much new path information which should give an additional indication, priority is given to the new path information, and it is desirable that it is made to carry out the down link of it to a car. as priority -- for example -- Traffic is abundant links It is the link through which it has passed at the high speed Based on being a link near a self-vehicle location etc., it is made to carry out a down link.

[0022] Moreover, since possibility that it is the trunk root is high when there is much data of the path concerned even if it is the case where consider new path information as a path link, and an additional indication is given by the car, a path is emphasized (it is about the width of road), and it is made to display.

[0023] Furthermore, although the new path information in the area returned from center equipment 15 of being used for retrieval, guidance induction, and a display in the Nabih equipment 1 of a car 10 is natural, as for whether new path information is used for a display thru/or guidance induction, it is desirable for the user to enable it to choose.

[0024] Moreover, there is a limitation in the storage capacity in Nabih equipment naturally, and when this limitation is arrived at, the need of receiving and accumulating a new link information comes out by eliminating a part among the accumulated link informations.

[0025] Then, the user of Nabih equipment enables it to set up the evaluation value of the link information based on the usefulness of a link, and the low link of evaluation is eliminated and enables it to receive and accumulate a new link information based on this. Therefore, as usefulness of a link, the link around for example, a (1) self-vehicle location is made high [usefulness].

(2) Make high [usefulness] the link used for retrieval, and the link which remained in the retrieval result.

(3) Make high [usefulness] the link it actually ran.

(4) A vehicle makes high [usefulness] the link of the area (map storing unit) it runs frequently.

(5) Make a link reliable as a link information high [usefulness].

(6) Make a new link high [usefulness].

(7) Make high [usefulness] the link through which it can pass at high speed.

(8) Make high [usefulness] the link which can cross a railroad, a river, etc.

[0026] It is arbitrary by which ranking a user evaluates a link to the usefulness of such a link, and it becomes possible by eliminating the low link information of evaluation suitably based on it to set to the Nabih equipment which has a limitation in memory capacity, and to receive and accumulate a new link information.

[0027] In the above-mentioned explanation, path data having not pointed out only the case of a single link and pointing out the case of two or more links should also care about a certain thing.

[0028]

[Effect of the Invention] This invention is a renewal system of dynamic map data which consists of the navigation equipment and this navigation equipment which are carried in a car, and center equipment which performs an informational exchange as mentioned above. When it checks that it is the path which is not in path data based on the transit historical data transmitted from said navigation equipment, said center equipment It has at least a means to transmit the path information which shows that it is the new path which is not in path data to said navigation equipment. Said navigation equipment A means to transmit transit historical data including positional information to said center equipment when a car runs the path which is not in path data, A means to receive the path information which shows that it is the new path which is not in path data from said center equipment, It has a means to display said new path information received from said center equipment on a display. It is characterized by navigation equipment and center equipment updating map data dynamically, and according to the renewal system of dynamic map data of this invention, the effectiveness that the map data updated by the latest can be displayed on navigation equipment by the down link is acquired.

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TECHNICAL FIELD

[Field of the Invention] Especially this invention is constituted so that the map data updated by the latest can be displayed on the display of navigation (it is hereafter called Nabih for short) equipment by the down link about the renewal system of dynamic map data.

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PRIOR ART

[Description of the Prior Art] It enables it to receive road traffic information by Nabih in the car in the conventional VICS system from facilities established in an FM multiplex broadcast or the road side, such as an electric-wave beacon and an optical beacon.

[0003] Under the present circumstances, it is made to transmit ID information on a car to reception and coincidence using a mounted transmitter, and this is transmitted to VICS Center, a traffic information center, and the Public Safety Commission and a road administrator, and comes to be utilized as delay, accident information, a high-speed traffic information, etc. with this new.

[0004] In the conventional navigation system, the map data of Nabih equipment are usually early, and it has become one year of renewal of data, and had become the structure which cannot be updated if one year does not pass on the car which took lessons from the data of the road which is not in the data, i.e., the map data, of the road which increase in number day by day, and has Nabih equipment with much trouble, either.

[0005] By the way, the car location calculation means 20 for generally, computing the location of a car, as navigation equipment is shown in drawing 7, The information retrieval means 23 for searching a facility using etc., and the path planning means 21 for searching for the path to the facility, It consists of a guiding means 22 which guides a self-vehicle in accordance with the path for which it searched, a display-control means 25 for making it display on the drops 26, such as a liquid crystal display and a CRT display, and map data 27 memorized by storages, such as CD-ROM.

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EFFECT OF THE INVENTION

[Effect of the Invention] This invention is a renewal system of dynamic map data which consists of the navigation equipment and this navigation equipment which are carried in a car, and center equipment which performs an informational exchange as mentioned above. When it checks that it is the path which is not in path data based on the transit historical data transmitted from said navigation equipment, said center equipment It has at least a means to transmit the path information which shows that it is the new

path which is not in path data to said navigation equipment. Said navigation equipment A means to transmit transit historical data including positional information to said center equipment when a car runs the path which is not in path data, A means to receive the path information which shows that it is the new path which is not in path data from said center equipment, It has a means to display said new path information received from said center equipment on a display. It is characterized by navigation equipment and center equipment updating map data dynamically, and according to the renewal system of dynamic map data of this invention, the effectiveness that the map data updated by the latest can be displayed on navigation equipment by the down link is acquired.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] This invention solves the above-mentioned conventional problem, and it aims at offering the renewal system of dynamic map data constituted so that the map data updated by the latest could be displayed on navigation equipment by the down link.

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MEANS

[Means for Solving the Problem] In order to solve the above-mentioned problem, this invention is a renewal system of dynamic map data which consists of the navigation equipment and this navigation equipment which are carried in a car, and center equipment which performs an informational exchange. When it checks that it is the path which is not in path data based on the transit historical data transmitted from said navigation equipment, said center equipment It has at least a means to transmit the path information which shows that it is the new path which is not in path data to said navigation equipment. Said navigation equipment A means to transmit transit historical data including positional information to said center equipment when a car runs the path which is not in path data, A means to receive the path information which shows that it is the new path which is not in path data from said center equipment, It has a means to display said new path information received from said center equipment on a display, and

is characterized by navigation equipment and center equipment updating map data dynamically.

[0008] The effectiveness that the map data which were updated by the above at the latest according to the renewal system of dynamic map data of this invention can be displayed on navigation equipment by the down link is acquired.

[0009]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained using a drawing.

[0010] Drawing 1 shows the whole renewal system configuration of dynamic map data in the gestalt of operation of this invention, and each car 10 is equipped with Nabih equipment 1 and the map data file 2 in which renewal of data is possible in drawing 1. Nabih equipment 1 communicated with the car location calculation means for computing a car location at worst based on a sensor input, the path hysteresis data file which records an additional path with the directions from the car location calculation means, and center equipment, and the newest map data come to hand, or it is equipped with the means of communications for transmitting the path historical data which the self-vehicle discovered to center equipment in here.

[0011] Center equipment 15 is equipped with the center section 3 equipped with the means of communications for exchanging data with each car 10, the map data file 4 in which renewal of data is possible, and the transit path history file 5 which records the path historical data sent from each car 10.

[0012] Actuation of the renewal system of dynamic map data in the gestalt of operation of this invention shown in drawing 1 is explained referring to drawing 2 thru/or drawing 6 below.

[0013] In drawing 1 thru/or drawing 6, since path historical data are transmitted to center equipment 15 using the Nabih equipment 1 of a car 10 when it runs the road which does not have each car in map data (up link), with center equipment 15, this is recorded and accumulated at the transit path history file 5.

[0014] If drawing 2 explains this, if map matching is carried out and matching is correct, with the Nabih equipment 1 of each car, an update process of a self-vehicle location will perform as it is, but when it can presume that it is running a new road by the case where matching separates, for example, a self-vehicle location, a self-vehicle vector, etc. record and accumulate continuously as additional path information at transit path record processing, i.e., a path hysteresis data file.

[0015] processing when matching separates from drawing 3 -- illustrating -- a car -- since -- For the car, since it is the continuation of self-vehicle positional information which will be in the condition of not matching if it moves on path hysteresis, it records this on a path hysteresis data file as additional path information.

[0016] Moreover, drawing 4 shows the communications processing of center equipment 15 and a car 10. In drawing 4, if the Request to Send of new information is performed to center equipment 15 from a car 10, the path information which the center section 3 is accumulating in the car 10 from center equipment 15 will be returned to a car 10 from center equipment 15. The additional path information which the car 10 discovered and recorded on center equipment 15 from the car 10 on the other hand is transmitted.

[0017] Drawing 5 shows the configuration concerning record of the path historical data uplinked from the car 10 by which record processing is carried out with center equipment 15, and, so to speak, illustrates the contents of the transit path history file 5. In drawing 5, record and are recording of the map data in center equipment 15 Path historical data including the path information presumed that the car discovered (in this) data, such as a LAT LONG point thru/or a velocity vector train, -- containing -- sequence-of-points information (on drawing) The sequence-of-points information record means 6 recorded and accumulated as being abbreviated to sequence of points info, The sequence of points showing the same road uplinked from two or more cars thru/or a vector train are collected as one path link. Record and the information intensive means 7 to accumulate, It consists of path information storing means 8 to store the path historical data of only the path link from this information intensive means, and sequence-of-points information. Therefore, when the car has required new path data, the down link of the link cost can be carried out, and it can be made to use for path planning etc. with center equipment 15, since the cost of a new path link is created from the velocity vector train in path historical data and this can be recorded and accumulated.

[0018] As shown in drawing 5, as sequence-of-points information, the sequence of points of the

trigonum mark are obtained from a certain car, the sequence of points of the square mark are obtained from another car, and the sequence of points of a round mark are obtained from still more nearly another car, and when each is given to the information intensive means 7 and judged to be the same road, it will be recorded as one path link.

[0019] In addition, between the endpoints of the path link which is going to be added is searched, and when lower than the original cost, actuation of actually adding may be performed. This eliminates an unnecessary link and it becomes possible to carry out additional registration of the useful link.

[0020] If it is drawing for explaining the down link of the new path information over a car from center equipment and the road display demand including the area for the Nabih display is transmitted from a car in drawing 6 , drawing 6 With center equipment 15, as new path information, when it returns as sequence-of-points information in area unidentified when exploration is not yet settled and it has already made a site survey, it returns as path information [finishing / a check]. In this case, although new path information is considered as a path link and an additional indication is given by the car, the method of presentation of an additional path is changed as finishing [a check / be / unidentified], and it displays.

[0021] In addition, a down link is carried out in center equipment 15, when there is much new path information which should give an additional indication, priority is given to the new path information, and it is desirable that it is made to carry out the down link of it to a car. as priority -- for example -- Traffic is abundant links It is the link through which it has passed at the high speed Based on being a link near a self-vehicle location etc., it is made to carry out a down link.

[0022] Moreover, since possibility that it is the trunk root is high when there is much data of the path concerned even if it is the case where consider new path information as a path link, and an additional indication is given by the car, a path is emphasized (it is about the width of road), and it is made to display.

[0023] Furthermore, although the new path information in the area returned from center equipment 15 of being used for retrieval, guidance induction, and a display in the Nabih equipment 1 of a car 10 is natural, as for whether new path information is used for a display thru/or guidance induction, it is desirable for the user to enable it to choose.

[0024] Moreover, there is a limitation in the storage capacity in Nabih equipment naturally, and when this limitation is arrived at, the need of receiving and accumulating a new link information comes out by eliminating a part among the accumulated link informations.

[0025] Then, the user of Nabih equipment enables it to set up the evaluation value of the link information based on the usefulness of a link, and the low link of evaluation is eliminated and enables it to receive and accumulate a new link information based on this. Therefore, as usefulness of a link, the link around for example, a (1) self-vehicle location is made high [usefulness].

(2) Make high [usefulness] the link used for retrieval, and the link which remained in the retrieval result.

(3) Make high [usefulness] the link it actually ran.

(4) A vehicle makes high [usefulness] the link of the area (map storing unit) it runs frequently.

(5) Make a link reliable as a link information high [usefulness].

(6) Make a new link high [usefulness].

(7) Make high [usefulness] the link through which it can pass at high speed.

(8) Make high [usefulness] the link which can cross a railroad, a river, etc.

[0026] It is arbitrary by which ranking a user evaluates a link to the usefulness of such a link, and it becomes possible by eliminating the low link information of evaluation suitably based on it to set to the Nabih equipment which has a limitation in memory capacity, and to receive and accumulate a new link information.

[0027] In the above-mentioned explanation, path data having not pointed out only the case of a single link and pointing out the case of two or more links should also care about a certain thing.

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing showing the whole renewal system configuration of dynamic map data in the gestalt of operation of this invention,

[Drawing 2] The flow chart explaining actuation of transit path record processing with the car concerning the gestalt of operation of this invention,

[Drawing 3] Drawing for explaining the condition which will be the requisite for transit path record with the car concerning the gestalt of operation of this invention of not matching,

[Drawing 4] The timing diagram for explaining the communications processing of a car and center equipment,

[Drawing 5] Drawing having shown the configuration concerning record of the path historical data uplinked from the car by which record processing is carried out with center equipment,

[Drawing 6] Drawing for explaining the down link of the new path information over a car from center equipment,

[Drawing 7] It is drawing showing the general configuration of conventional navigation equipment.

[Description of Notations]

1 Nabih Equipment

2 Map Data File Which Can be Updated (Car)

3 Center Section

4 Map Data File Which Can be Updated (Center Equipment)

5 Transit Path Hysteresis Data File

6 Sequence of Points or Vector Train Record Means

7 Information Intensive Means

8 Path Information Storing Means

10 Car

15 Center Equipment

20 Car Location Calculation Means

21 Path Planning Means

22 Guiding Means

23 Information Retrieval Means

24 Memory

25 Display-Control Means

26 Display Means

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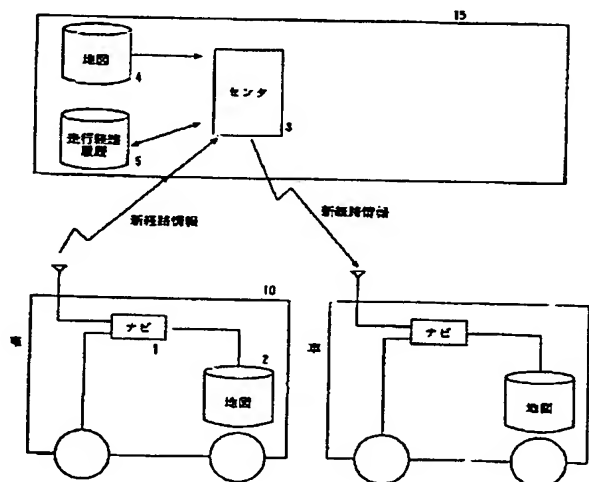
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(54) 【発明の名称】 動的地図データ更新システム

(57) 【要約】

【課題】 直近に更新された地図データをダウンリンクによりナビゲーション装置で表示できるよう構成した動的地図データ更新システムを提供する。

【解決手段】 経路データにない経路を車両が走行した場合に、位置情報を含む走行履歴データをセンタ装置15に伝達する手段1と、車両から伝達された前記走行履歴データに基づいてセンタ装置15が経路データにない経路であると確認した場合に、車両に経路データにない新たな経路であることを示す経路情報を伝達する手段3と、センタ装置15から伝達された前記新たな経路情報を表示する手段1とを備えることを特徴とする。



【特許請求の範囲】

【請求項1】 車両に搭載されるナビゲーション装置及び該ナビゲーション装置と情報のやり取りを行なうセンタ装置とからなる動的地図データ更新システムであって、

前記センタ装置は、前記ナビゲーション装置から伝達された走行履歴データに基づいて経路データにない経路であると確認した場合には、経路データにない新たな経路であることを示す経路情報を前記ナビゲーション装置に伝達する手段を少なくとも備え、

前記ナビゲーション装置は、経路データにない経路を車両が走行した場合に、位置情報を含む走行履歴データを前記センタ装置に伝達する手段と、

経路データにない新たな経路であることを示す経路情報を前記センタ装置から受信する手段と、前記センタ装置から受信した前記新たな経路情報を表示部に表示する手段を備え、

ナビゲーション装置およびセンタ装置が動的に地図データを更新することを特徴とする動的地図データ更新システム。

【請求項2】 車両に搭載されるナビゲーション装置及び該ナビゲーション装置と情報のやり取りを行なうセンタ装置とからなる動的地図データ更新システムであって、

前記センタ装置は、前記ナビゲーション装置から伝達された走行履歴データに基づいて経路データにない経路であるが未確認である場合には、経路データにない新たな経路であるが未確認であることを示す経路情報を前記ナビゲーション装置に伝達する手段を少なくとも備え、前記ナビゲーション装置は、経路データにない経路を車両が走行した場合に、位置情報を含む走行履歴データを前記センタ装置に伝達する手段と、

経路データにない新たな経路であるが未確認であることを示す経路情報を前記センタ装置から受信する手段と、前記センタ装置から受信した前記新たな経路であるが未確認である経路情報を通常の経路表示形態とは異なる形態で表示部に表示する手段を備え、ナビゲーション装置およびセンタ装置が動的に地図データを更新することを特徴とする動的地図データ更新システム。

【請求項3】 前記センタ装置が経路データにない経路であると確認する際には、複数の車両からの前記走行履歴データがアップリンクされることを特徴とする請求項1又は請求項2記載の動的地図データ更新システム。

【請求項4】 前記ナビゲーション装置で前記センタ装置から受信した新たな経路情報を表示する際、同一経路のデータが多い場合には、道を強調して表示するようにしたことを特徴とする請求項1又は請求項2記載の動的地図データ更新システム。

【請求項5】 前記ナビゲーション装置で前記センタ装

置から受信した新たな経路情報を表示する、あるいは表示しない、をナビゲーション装置ユーザが個別に選択できるようにしたことを特徴とする請求項1又は請求項2記載の動的地図データ更新システム。

【請求項6】 前記センタ装置が前記ナビゲーション装置に経路データにない新たな経路であることを示す経路情報を伝達する際には、交通量が豊富なリンクを優先的にダウンリンクすることを特徴とする請求項1又は請求項2記載の動的地図データ更新システム。

【請求項7】 前記センタ装置が前記ナビゲーション装置に経路データにない新たな経路であることを示す経路情報を伝達する際には、高速に通過できたリンクを優先的にダウンリンクすることを特徴とする請求項1又は請求項2記載の動的地図データ更新システム。

【請求項8】 前記センタ装置が前記ナビゲーション装置に経路データにない新たな経路であることを示す経路情報を伝達する際には、自車位置に近いリンクを優先的にダウンリンクすることを特徴とする請求項1又は請求項2記載の動的地図データ更新システム。

【請求項9】 前記センタ装置において経路データにない経路であると確認した場合には、車両がその経路を通過した場合の通過速度を考慮してリンクコストを計測しておき、前記ナビゲーション装置は前記リンクコストを経路探索に利用するようにしたことを特徴とする請求項1又は請求項2記載の動的地図データ更新システム。

【請求項10】 各車両とのデータのやり取りを行なうための通信手段を備えるセンタ部と、データ更新可能な地図データファイルと、各車両から送られてきた経路履歴データを記録する走行経路履歴ファイルとを備え、前記センタ部は、各車両から伝達された走行履歴データに基づいて経路データにない経路であると確認した場合には、経路データにない新たな経路であることを示す経路情報を前記車両に伝達する手段を少なくとも備えていることを特徴とするセンタ装置。

【請求項11】 各車両とのデータのやり取りを行なうための通信手段を備えるセンタ部と、データ更新可能な地図データファイルと、各車両から送られてきた経路履歴データを記録する走行経路履歴ファイルとを備え、前記センタ部は、各車両から伝達された走行履歴データに基づいて経路データにない経路であるが未確認である場合には、経路データにない新たな経路であるが未確認であることを示す経路情報を前記車両に伝達する手段を少なくとも備えていることを特徴とするセンタ装置。

【請求項12】 センサ入力を元に車両位置を算出するための車両位置算出手段と、その車両位置算出手段からの指示で追加経路を記録する経路履歴データファイルと、センタ装置と通信して最新の地図データを入手したり、自車が発見した経路履歴データをセンタ装置に送信するための通信手段とを備え、更に、経路データにない経路を車両が走行した場合に、前記通信手段を介して位

置情報を含む走行履歴データを前記センタ装置に伝達する手段と、経路データにない新たな経路であることを示す経路情報を前記センタ装置から受信する手段と、前記センタ装置から受信した前記新たな経路情報を表示部に表示する手段を備えることを特徴とするナビゲーション装置。

【請求項13】 センサ入力を元に車両位置を算出するための車両位置算出手段と、その車両位置算出手段からの指示で追加経路を記録する経路履歴データファイルと、センタ装置と通信して最新の地図データを入手したり、自車が発見した経路履歴データをセンタ装置に送信するための通信手段とを備え、更に、経路データにない経路を車両が走行した場合に、前記通信手段を介して位置情報を含む走行履歴データを前記センタ装置に伝達する手段と、経路データにない新たな経路であるが未確認であることを示す経路情報を前記センタ装置から受信する手段と、前記センタ装置から受信した前記新たな経路であるが未確認である経路情報を通常の経路表示形態とは異なる形態で表示部に表示する手段を備えることを特徴とするナビゲーション装置。

【請求項14】 前記センタ装置から受信した前記新たな経路を格納する手段を更に備えることを特徴とする請求項12又は請求項13記載のナビゲーション装置。

【請求項15】 前記新たな経路を格納する手段の記憶容量が不足したとき、新たな記憶領域を確保するために、自車位置周辺のリンク情報を残して他の不要なリンク情報を消去することを特徴とする請求項14記載のナビゲーション装置。

【請求項16】 前記新たな経路を格納する手段の記憶容量が不足したとき、新たな記憶領域を確保するために、探索に使用したリンク情報又は探索結果に残ったリンク情報を残して他の不要なリンク情報を消去することを特徴とする請求項14記載のナビゲーション装置。

【請求項17】 前記新たな経路を格納する手段の記憶容量が不足したとき、新たな記憶領域を確保するために、実際に走行したリンク情報を残して他の不要なリンク情報を消去することを特徴とする請求項14記載のナビゲーション装置。

【請求項18】 前記新たな経路を格納する手段の記憶容量が不足したとき、新たな記憶領域を確保するために、車が頻繁に走行する地域のリンク情報を残して他の不要なリンク情報を消去することを特徴とする請求項14記載のナビゲーション装置。

【請求項19】 前記新たな経路を格納する手段の記憶容量が不足したとき、新たな記憶領域を確保するために、リンク情報として信頼性の高いリンク情報を残して他の不要なリンク情報を消去することを特徴とする請求項14記載のナビゲーション装置。

【請求項20】 前記新たな経路を格納する手段の記憶容量が不足したとき、新たな記憶領域を確保するた

めに、新しいリンク情報を残して他の不要なリンク情報を消去することを特徴とする請求項14記載のナビゲーション装置。

【請求項21】 前記新たな経路を格納する手段の記憶容量が不足したとき、新たな記憶領域を確保するために、高速度で通過可能なリンク情報を残して他の不要なリンク情報を消去することを特徴とする請求項14記載のナビゲーション装置。

【請求項22】 前記新たな経路を格納する手段の記憶容量が不足したとき、新たな記憶領域を確保するために、鉄道、河川などを横断できるリンク情報を残して他の不要なリンク情報を消去することを特徴とする請求項14記載のナビゲーション装置。

【請求項23】 請求項15乃至請求項22記載のナビゲーション装置において、リンク情報を残すための基準が重複した場合には、それらの間に優先順位を付しておき、その優先順位に基いてリンク情報を残すようにしたことを特徴とする請求項15乃至請求項22記載のナビゲーション装置。

【請求項24】 追加されるリンクの端点間を探索し、元のコストより低い場合に加えることを特徴とする請求項1乃至請求項23記載のナビゲーション装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、動的地図データ更新システムに関し、特に直近に更新された地図データをダウンリンクによりナビゲーション（以下、ナビと略称する）装置の表示部に表示できるよう構成したものである。

【0002】

【従来の技術】従来のVICSシステムにおいては、FM多重放送や道路脇に設けられた電波ビーコン、光ビーコンなどの施設から、道路交通情報を車内のナビで受信できるようにされている。

【0003】この際、受信と同時に車載の送信機を使用して車両のID情報を伝達するようにし、これがVICSセンタ、交通情報センター及び公安委員会・道路管理者に電送され、これが新たな渋滞・事故情報・高速道路情報などとして活用されるようになる。

【0004】従来のナビゲーションシステムでは、通常、ナビ装置の地図データは早くて1年のデータ更新となっており、日に日に増える道路のデータ、すなわち地図データにない道路のデータ、については折角ナビ装置を備えている車両にも1年経たなければ更新できない仕組みとなっていた。

【0005】ところで一般にナビゲーション装置は、図7に示されるように、車両の位置を算出するための車両位置算出手段20と、利用したい施設などを検索するための情報検索手段23と、その施設までの経路を探索するための経路探索手段21と、探索した経路に沿って自車を誘

導する誘導手段22と、液晶表示器やCRTディスプレイなどの表示器26に表示させるための表示制御手段25と、CD-ROMなどの記憶媒体に記憶された地図データ27とから構成されている。

【0006】

【発明が解決しようとする課題】本発明は上記従来の問題を解決するもので、直近に更新された地図データをダウンリンクによりナビゲーション装置に表示できるように構成した動的地図データ更新システムを提供することを目的とする。

【0007】

【課題を解決するための手段】上記問題を解決するために本発明は、車両に搭載されるナビゲーション装置及び該ナビゲーション装置と情報のやり取りを行なうセンタ装置とからなる動的地図データ更新システムであって、前記センタ装置は、前記ナビゲーション装置から伝達された走行履歴データに基づいて経路データにない経路であると確認した場合には、経路データにない新たな経路であることを示す経路情報を前記ナビゲーション装置に伝達する手段を少なくとも備え、前記ナビゲーション装置は、経路データにない経路を車両が走行した場合に、位置情報を含む走行履歴データを前記センタ装置に伝達する手段と、経路データにない新たな経路であることを示す経路情報を前記センタ装置から受信する手段と、前記センタ装置から受信した前記新たな経路情報を表示部に表示する手段を備え、ナビゲーション装置およびセンタ装置が動的に地図データを更新することとを特徴とする。

【0008】以上により、本発明の動的地図データ更新システムによれば、直近に更新された地図データをダウンリンクによりナビゲーション装置に表示できるという効果が得られる。

【0009】

【発明の実施の形態】以下、本発明の実施の形態について、図面を用いて説明する。

【0010】図1は本発明の実施の形態における動的地図データ更新システムの全体構成を示しており、図1において、各車両10は、ナビ装置1と、データ更新可能な地図データファイル2とを備えている。ここにおいてナビ装置1は最低限、センサ入力を用いて車両位置を算出するための車両位置算出手段と、その車両位置算出手段からの指示で追加経路を記録する経路履歴データファイルと、センタ装置と通信して最新の地図データを入手したり、自車が発見した経路履歴データをセンタ装置に送信するための通信手段とを備えている。

【0011】センタ装置15は、各車両10とのデータのやりとりを行なうための通信手段を備えるセンタ部3と、データ更新可能な地図データファイル4と、各車両10から送られてきた経路履歴データを記録する走行経路履歴ファイル5とを備えている。

【0012】図1に示される本発明の実施の形態における動的地図データ更新システムの動作について、以下図2ないし図6を参照しながら説明する。

【0013】図1ないし図6において、各車両が地図データにない道路を走行したときには、車両10のナビ装置1を使用してセンタ装置15に経路履歴データが送信（アップリンク）されてくるので、センタ装置15ではこれを走行経路履歴ファイル5に記録・蓄積する。

【0014】これを図2で説明すると、各車両のナビ装置1ではマップマッチングを実施し、マッチングが合っていればそのまま自車位置の更新処理を実行するが、マッチングが外れた場合でそれが新しい道路を走行していると推定できるときには、走行経路記録処理、すなわち経路履歴データファイルに追加経路情報として、例えば自車位置や自車ベクトルなどを連続的に記録・蓄積する。

【0015】図3はマッチングが外れた場合の処理について図解したものであり、車両がから 1に移ると非マッチング状態となるものが、その車両にとっては経路履歴上では自車位置情報の連続なのでこれを経路履歴データファイルに追加経路情報として記録する。

【0016】また図4は、センタ装置15と車両10との通信処理を示したものである。図4において、車両10からセンタ装置15に新情報の送信要求を行なうと、センタ装置15から車両10にセンタ部3が蓄積している経路情報をセンタ装置15から車両10に返送してくる。その一方で車両10からセンタ装置15に車両10が発見し記録した追加経路情報を送信する。

【0017】図5はセンタ装置15で記録処理される車両10からアップリンクされてきた経路履歴データの記録に係る構成を示したものであり、いわば走行経路履歴ファイル5の中身を図解したものである。図5においてセンタ装置15における地図データの記録・蓄積は、車両が発見したと推定される経路情報を含む経路履歴データ（この中には、緯度経度点ないし速度ベクトル列などのデータを含む）を点列情報（図上では、点列infoと略されている）として記録・蓄積する点列情報記録手段6と、複数車両からアップリンクされた同一路を表す点列ないしベクトル列を1つの経路リンクとして集約して記録・蓄積する情報集約手段7と、この情報集約手段からの経路リンクおよび点列情報だけの経路履歴データを格納する経路情報格納手段8とから構成されている。従って、センタ装置15では、経路履歴データにおける速度ベクトル列から新経路リンクのコストを作成しておき、これを記録・蓄積するようにすることができるので、もしも車両が新経路データを要求してきた場合には、そのリンクコストをダウンリンクして経路探索などに利用させることができる。

【0018】図5に示されるように点列情報としては、ある車両からは三角印の点列が得られ、別の車両からは

四角印の点列が得られ、さらに別の車両からは丸印の点列が得られ、それぞれが情報集約手段7に与えられて同一道路と判断される場合には1つの経路リンクとして記録されることになる。

【0019】なお、追加されようとしている経路リンクの端点間を探索し、元のコストよりも低い場合は実際に加えるという動作を行なっても良い。これにより不要なリンクを排除し、有用なリンクを追加登録することが可能となる。

【0020】図6はセンタ装置から車両に対する新経路情報のダウンリンクを説明するための図であり、図6において車両からナビ表示のためのエリアを含む道路表示要求が送信されてくると、センタ装置15では新経路情報として、実地調査が未だ済んでいない場合には、未確認のエリア中の点列情報として返送し、それが実地調査を既に行なっていた場合には、確認済みの経路情報として返送する。この場合、車両では新経路情報を経路リンクとして追加表示するが、未確認と確認済みとは追加経路の表示方法を変えて表示する。

【0021】なお、センタ装置15においてダウンリンクして追加表示すべき新経路情報が多い場合には、その新経路情報に優先順位をつけておき、それを車両にダウンリンクさせるようにすることが望ましい。優先順位としては、例えば、交通量が豊富なリンクであること、高速に通過できたリンクであること、自車位置に近いリンクであること、などに基いてダウンリンクするようにする。

【0022】また車両で新経路情報を経路リンクとして追加表示する場合であっても、当該経路のデータが多い場合には、それが幹線ルートである可能性が高いことから、道を強調（例えば、道幅を太く）して表示するようにする。

【0023】さらに、センタ装置15から返送されたエリア中の新経路情報は、車両10のナビ装置1において探索、案内誘導、表示に利用されることはもちろんであるが、新経路情報を表示しないし案内誘導に使用するかどうかはユーザが選択できるようにしておくことが望ましい。

【0024】また、ナビ装置における記憶容量にはおのずと限界があり、この限界に達した場合、蓄積しているリンク情報のうち一部を消去することによって、新しいリンク情報を受信・蓄積する必要性が出てくる。

【0025】そこで、リンクの有用性に基くリンク情報の評価値をナビ装置のユーザが設定できるようにしておき、これに基いて評価の低いリンクは消去するようにし、新しいリンク情報を受信・蓄積できるようにする。そのためにリンクの有用性として、例えば、

- (1) 自車位置周辺のリンクを有用性が高いとする。
- (2) 探索に使用したリンク、探索結果に残ったリンクを有用性が高いとする。
- (3) 実際に走行したリンクを有用性が高いとする。

(4) 車が頻繁に走行する地域（地図格納単位）のリンクを有用性が高いとする。

(5) リンク情報として信頼性の高いリンクを有用性が高いとする。

(6) 新しいリンクを有用性が高いとする。

(7) 高速度で通過可能なリンクを有用性が高いとする。

(8) 鉄道、河川などを横断できるリンクを有用性が高いとする。

【0026】このようなリンクの有用性に対してユーザがどの順位でリンクを評価するかは任意であり、それに基づいて評価の低いリンク情報を適宜消去することにより、記憶容量に限りがあるナビ装置において新しいリンク情報を受信・蓄積することが可能となる。

【0027】上記した説明において、経路データは、単一のリンクの場合のみを指しているのではなく、複数のリンクの場合を指すこともあることに留意されたい。

【0028】

【発明の効果】以上のように本発明は、車両に搭載されるナビゲーション装置及び該ナビゲーション装置と情報のやり取りを行なうセンタ装置とからなる動的地図データ更新システムであって、前記センタ装置は、前記ナビゲーション装置から伝達された走行履歴データに基づいて経路データにない経路であると確認した場合には、経路データにない新たな経路であることを示す経路情報を前記ナビゲーション装置に伝達する手段を少なくとも備え、前記ナビゲーション装置は、経路データにない経路を車両が走行した場合に、位置情報を含む走行履歴データを前記センタ装置に伝達する手段と、経路データにない新たな経路であることを示す経路情報を前記センタ装置から受信する手段と、前記センタ装置から受信した前記新たな経路情報を表示部に表示する手段を備え、ナビゲーション装置およびセンタ装置が動的に地図データを更新することを特徴とするものであり、本発明の動的地図データ更新システムによれば、直近に更新された地図データをダウンリンクによりナビゲーション装置に表示できるという効果が得られる。

【図面の簡単な説明】

【図1】本発明の実施の形態における動的地図データ更新システムの全体構成を示す図、

【図2】本発明の実施の形態に係る車両での走行経路記録処理の動作を説明するフローチャート、

【図3】本発明の実施の形態に係る車両での走行経路記録の前提となる非マッチングの状態を説明するための図、

【図4】車両とセンタ装置との通信処理を説明するためのタイムチャート、

【図5】センタ装置で記録処理される車両からアップリンクされてきた経路履歴データの記録に係る構成を示した図、

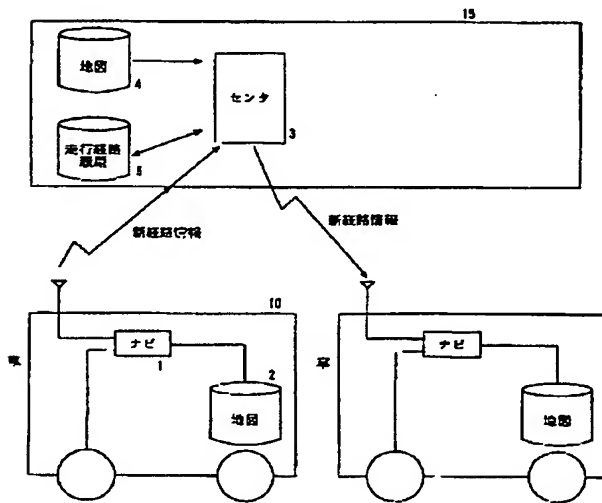
【図6】センタ装置から車両に対する新経路情報のダウンロードリンクを説明するための図、

【図7】従来のナビゲーション装置の一般的な構成を示す図である。

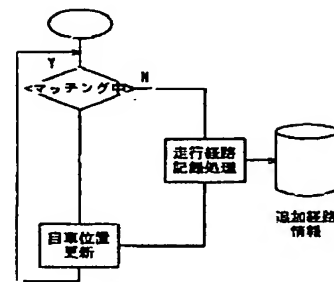
【符号の説明】

- | | |
|-------------------------|-------------|
| 1 ナビ装置 | 7 情報集約手段 |
| 2 更新可能な地図データファイル（車両） | 8 経路情報格納手段 |
| 3 センタ部 | 10 車両 |
| 4 更新可能な地図データファイル（センタ装置） | 15 センタ装置 |
| 5 走行経路履歴データファイル | 20 車両位置算出手段 |
| 6 点列或いはベクトル列記録手段 | 21 経路探索手段 |
| | 22 誘導手段 |
| | 23 情報検索手段 |
| | 24 メモリ |
| | 25 表示制御手段 |
| | 26 表示手段 |

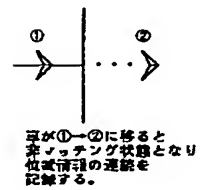
【図1】



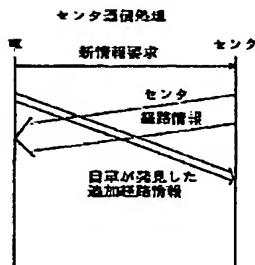
【図2】



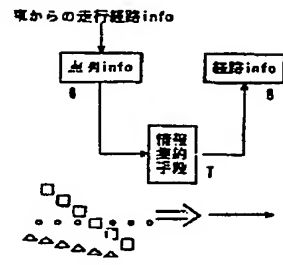
【図3】



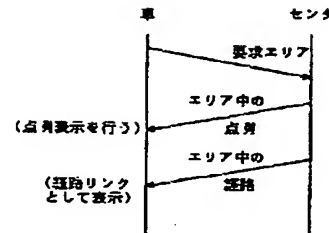
【図4】



【図5】



【図6】



【図7】

